Oct. 24, 1961 J. VAN ROOJEN 3,005,296

DUST COLLECTING AND DISPOSING SYSTEM FOR GRINDERS

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Fig. 1

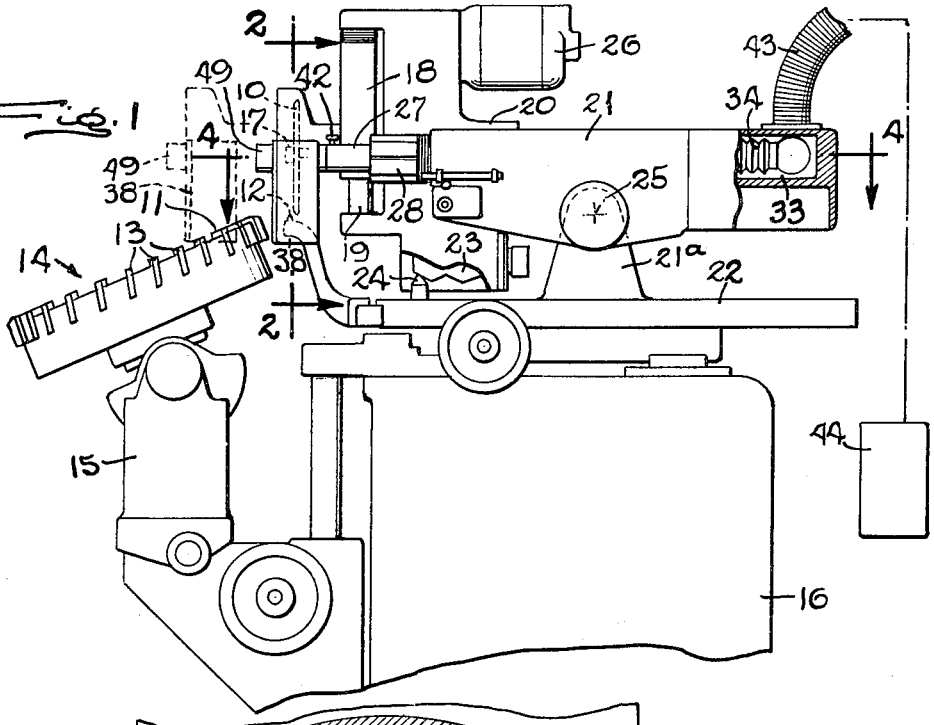

Fig. 2

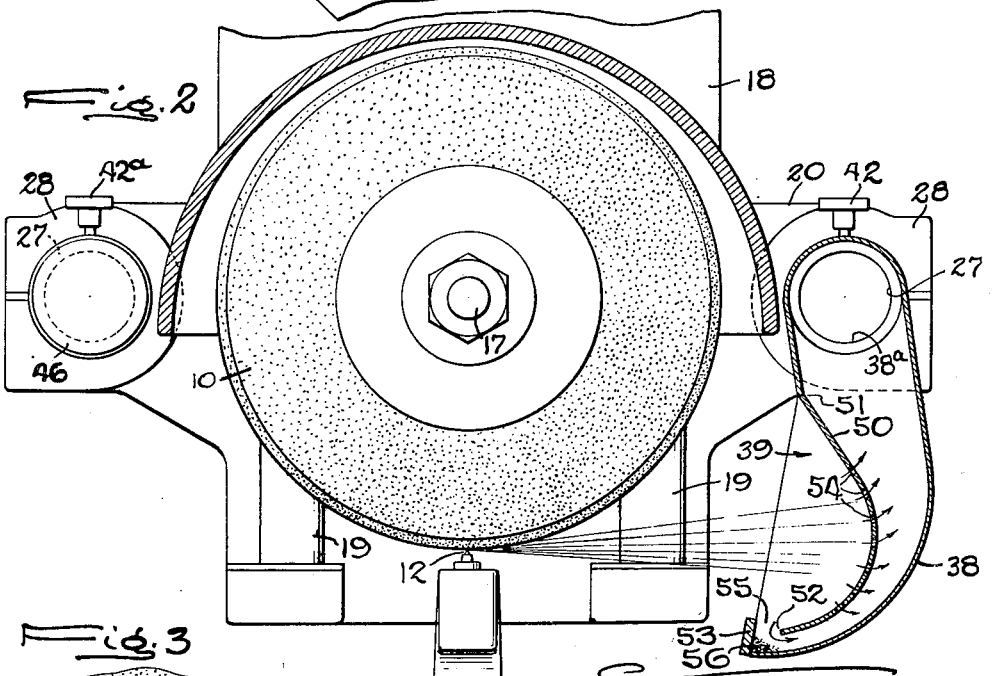

Fig. 3

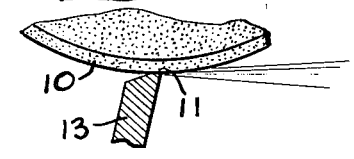

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Fig. 4

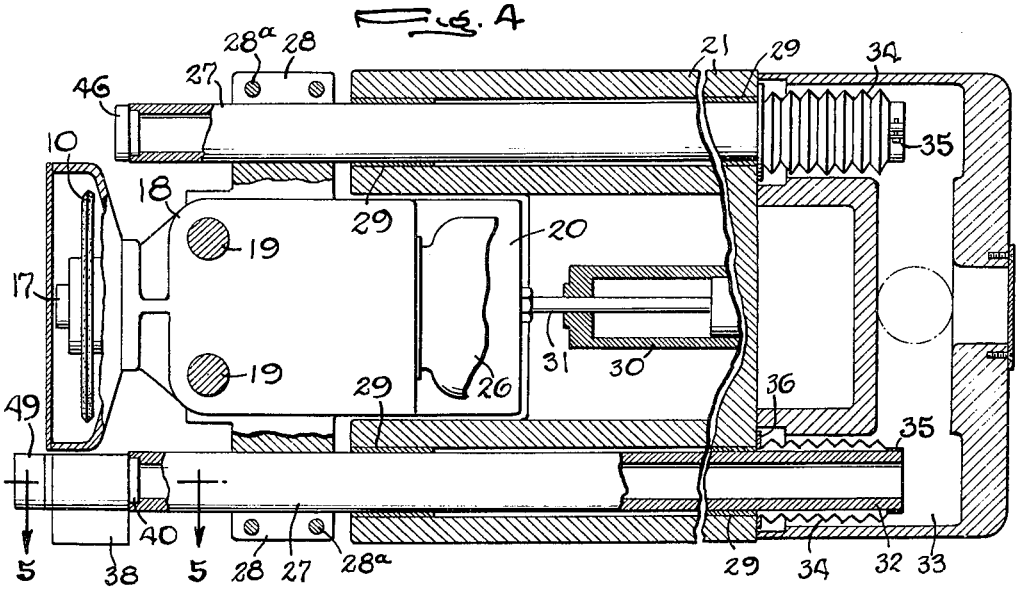


Fig. 5

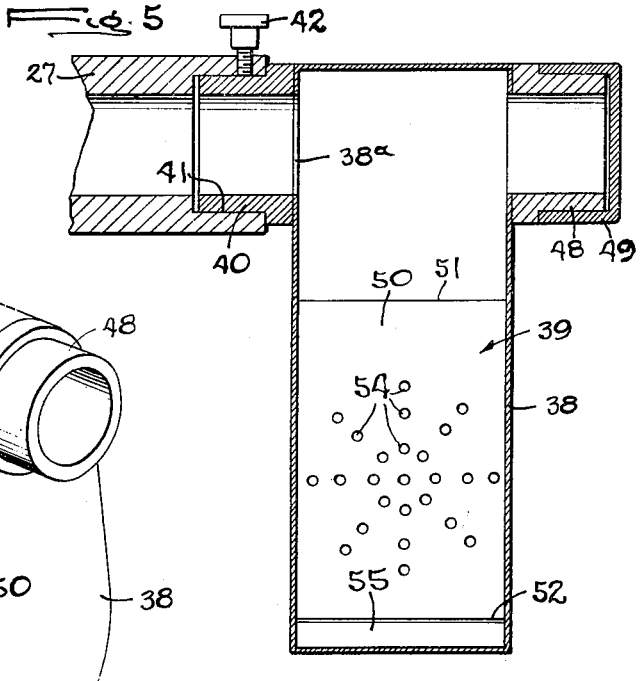
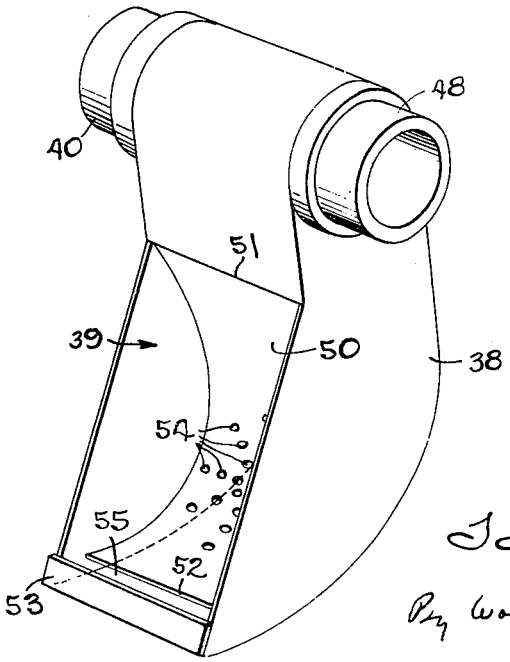


Fig. 6



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DUST COLLECTING AND DISPOSING SYSTEM FOR GRINDERS

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This invention relates to the collection and disposal of abrasive dust produced in a grinding operation and has more particular reference to a grinder of the type in which the dust to be collected is produced during reciprocation of a power rotated abrasive wheel back and forth across the work and/or a tool for dressing the wheel periphery.

The general object is to provide a grinder of the above character in which the abrasive dust discharged from the grinding wheel is carried away through an air duct enclosed within the grinder structure and thus disposed in an out-of-the-way location.

A more detailed object is to utilize one of the wheel head guide elements as a conduit for conveying the dust away from the wheel.

The invention also resides in the novel and efficient construction of the hood for catching the abrasive particles and delivering the same to the air duct.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings, in which

FIGURE 1 is a fragmentary side elevation of a cutter sharpener embodying the novel features of the present invention.

FIG. 2 is a fragmentary sectional view taken along line 2—2 of FIG. 1 during dressing of the grinding wheel.

FIG. 3 is a fragmentary section taken along the plane of the grinding wheel during engagement with a blade of the cutter being sharpened.

FIG. 4 is a plan view with parts broken away and shown as sections taken along the line 4—4 of FIG. 1.

FIG. 5 is a fragmentary section taken along the line 5—5 of FIG. 4.

FIG. 6 is a perspective view of the dust collecting hood.

For purposes of illustration, the invention is shown in the drawings embodied in a grinding machine in which a power rotated abrasive wheel 10 is reciprocated back and forth along a generally horizontal path to pass the wheel periphery across a work surface 11 and also across a stationary diamond point 12 for dressing the wheel. In this instance, the work surface is the edge of a blade 13 on a cutter 14 mounted on a support 15 which is carried by the machine base 16 and is indexable to bring successive blades into operative position.

The wheel is fast on a shaft 17 journaled in a head 18 adapted to be adjusted vertically along guides 19 on the front of a carriage 20 slidable horizontally on a cradle 21. Trunnions projecting from opposite sides of the latter are journaled in lugs 21a upstanding from a slide 22 on top of the base 16. As the carriage is slid back and forth a cam 23 thereof rides a follower 24 to rock the cradle about a fulcrum 25 and cause the lower edge of the wheel to contact the dressing tool and also follow the contour of the blade edge to be sharpened. The wheel is belt driven by a motor 26 mounted on the head 18.

In accordance with the present invention, the coacting guideways for mounting the wheel carriage to slide back and forth along its working path are made hollow and arranged in a novel manner relative to the wheel so as to perform the additional function of a conduit for receiving abrasive dust and metal particles discharged tangentially from the wheel periphery and conveying a stream

of air by which such dust is carried away to a point of disposal preferably at the rear of the machine. In the present instance, there are two sets of such guideways radially spaced outwardly from the wheel 10 and formed by tubular bars 27 rigidly secured intermediate their ends to opposite sides of the carriage 20 at points spaced behind the wheel. For this purpose, the tubes, which preferably are cylindrical in cross-section, extend through split lugs 28 projecting from opposite sides of the carriage and clamped against the tubes by screws 28a. The elongated rearwardly projecting ends of the tubes extend through and beyond guideways formed by bushings 29 spaced along and mounted in opposite edge portions of the cradle 21. The bars and the wheel head rigid therewith constitute a cantilever of variable length and slidable forwardly from the retracted position shown in FIGS. 1 and 4 to pass the lower edge of the wheel successively across the dressing point 12 and the blade edge 11. Such reciprocation through the desired range may be effected by a hydraulic servo including a cylinder 30 fixed to the cradle 21 and a piston slidable in the cylinder with its rod 31 secured to the rear end of the carriage 20.

In all positions of the wheel head, the rear ends 32 of the bars 27 project beyond the rear guide bushings 29 and communicate with a chamber 33 in the cradle 21. The projecting ends of the bars are telescoped with and covered by axially collapsible flexible sealing sleeves 34 secured to the bars ends by clamps 35, the forward ends 36 being attached and sealed to surfaces on the cradle surrounding the rear ends of the bushings 29.

Mounted on and enclosing the forward end of at least one of the guide bars 27 is a hood 38 defining a cavity which communicates through a side opening 38a with the interior of the bar and is formed with an opening 39 facing laterally toward the lower edge of the wheel and positioned to receive the dust and metal particles thrown off from the wheel periphery. Herein, the hood comprises a sheet metal wheel having a side flange 40 (FIGS. 5 and 6) at its upper end surrounding the opening 38a and telescope into the counter-bored outer end 41 of the tube 27 and detachably secured to the latter as by a set screw 42. The hood thus hangs downwardly from the tube and is adjustable along and about the axis of the latter so as to dispose the opening 39 in the path of the discharged dust particles. The opening 39 which is shown herein as being rectangular in shape and elongated vertically, may be of other shapes and in each instance is made large enough to catch all of the particles even though the hood is spaced horizontally a substantial distance from the active portion of the wheel.

To carry away the particles thrown into the hood opening, a continuous stream of air is induced to flow rearwardly through the hooded tube 27. This is accomplished by maintaining the chamber 33 under a vacuum of sufficient magnitude to produce the desired velocity of the air flow. For this purpose a flexible hose 43 (FIG. 1) is connected to the cradle 21 in communication with the chamber 33 and extended to a vacuum source 44 including a suitable power driven pump and a dust separator (not shown). The flow of air into the chamber 33 through the other of the guide tubes 37 is prevented by closing the forward end of the latter as by pressing a suitable plug 46 into the latter as shown in FIG. 1.

With this arrangement, air is drawn continuously into the hood 38 through the opening 39 and flows rearwardly through the tube 37 and out of the machine through the chamber 33 to the dust separator at the rear of the machine. This action takes place in all of the different horizontal positions of the wheel head 18 since the hood 38 is rigid with the latter and the rear end of the tube

27 is always in communication with the vacuum cavity 33.

To achieve optimum efficiency in carrying away the dust caught in the hood, the invention, in another of its aspects, contemplates reducing the cross-section of the hood 38 inwardly from the opening 39 to an area substantially less than that of the opening so as to increase correspondingly the velocity of the inwardly flowing air stream to which the particles of dust become subjected after being trapped within the hood. Herein, this is accomplished by interposing within the hood and in the path of the discharged particles of a plate 50 which covers the full width of the hood and is inclined downwardly and inwardly from the upper edge of the opening 39 as indicated at 51 and then, at about the vertical center of the opening, curves reversely and outwardly along the curved bottom of the hood. The lower edge 52 of the plate terminates short of and somewhat below the upper edge of a flange 53 defining the lower edge of the hood opening 39. The curved plate may be fastened in the hood in any desired way as by welding its edges to the walls of the hood.

The plate 50 is perforated by holes 54 which are distributed over substantially the full width of the plate and the major portion of its height and are sized to provide, together with the area of the opening 55 between the edge 52 and the bar 53, a total area through the hood approximately equal to the area of the air passage through the tube 27. As a result, the velocity of the air flowing through the plate holes 54, as indicated by the arrows in FIG. 2, is great enough to carry into and through the holes any particle of dust which comes opposite the holes. Particles which escape the holes 54 slide down the curved face of the plate 50 and are either drawn through the opening 55 into the tube 27 or are caught and remain in the bottom of the hood behind the bar 53 as indicated at 56 (FIG. 2). This accumulation may be disposed of from time to time after removal of the hood from its supporting tube 27.

With the arrangement above described, it will be apparent that the abrasive particles and dust discharged from the wheel periphery in all of its positions along the guideways 29 become trapped beyond the hood opening 39 and all except the heaviest particles are carried on by the high velocity air streams through the holes 54 and the opening 55 and into the conduit 27 to the chamber 33. By reducing the area of the hood beyond the opening 39 in the manner above described, the dust particles may be disposed of efficiently without maintaining an objectionably high vacuum in the chamber 33. Beyond the hood, the entire dust conveying system is composed of parts of the machine itself and disposed in an out-of-the-way location wholly within the machine structure. The entire external surface of the latter is exposed for the mounting of the operating controls of the machine in locations most convenient for the operator.

Advantage is also taken of the double guideways of the tool head to adapt the improved dust disposal system for use in either direction of rotation of the wheel 19. For this purpose, both of the guide bars 27 are made tubular and open at their rear ends into the vacuum chamber 33 while providing a dust catcher at the forward end of either of the tubes, the other being closed. Herein, the hood 38 is mountable on either of the tubes 27 and the plug 46 is similarly transferable from one tube to the other. To this end, a flange 48 (FIG. 5) similar to the flange 40 is formed on the side of the hood 38 opposite the first flange and thus used to support the hood from the left hand tube 27 with the opening 39 facing to the right and toward the wheel. Thus, by manipulating the screws 42 and 42a, the hood may be removed from one tube and transferred to the other. Then the tube not to be used as the air conduit is closed by the plug 46 and the cap 49 is placed over the exposed flange 40 or 48 of the hood.

When the hood 38 and the plug 46 are mounted as shown in FIGS. 2 and 4, the dust disposal system is adapted for use with the wheel turning counterclockwise during which the dust is thrown to the right as illustrated in FIG. 3. In this case, the cap 49 is pressed onto the flange 48. If the wheel is to be turned clockwise, the plug 46 is removed from the left hand tube 27 and the hood transferred to this tube, the flange 48 being telescoped into this tube and fastened by the screw 42a with the opening 39 in line with the path of discharge of dust from the wheel. The cap 49 is then fitted over the flange 40.

I claim as my invention:

1. In a grinder, the combination of, a support having laterally spaced parallel guideways thereon, bars slidable in said guideways and projecting therefrom, a head secured to the projecting end portions of said bars, at least one of said bars being tubular and having an air passage extending therethrough, a rotary abrasive wheel mounted on said head between said bars, a collecting hood communicating with said air passage and mounted on one end of said tubular bar to receive dust thrown from the periphery of said wheel, and means in said support defining a vacuum chamber communicating with the other end of said tubular bar.

2. A grinder as defined in claim 1 in which an end portion of said tubular bar projects into said chamber in all positions of said wheel head, said end portion being enclosed by an axially extensible and contractible sleeve secured at one end to the end of the bar and at the other end to a wall of said chamber.

3. In a grinder, the combination of, a support having laterally spaced parallel guideways thereon, bars slidable in said guideways and projecting therefrom, a head secured to the projecting end portions of said bars, at least one of said bars being tubular and having an air passage extending therethrough, a rotary abrasive wheel mounted on said head between said bars, a collecting hood, means mounting said hood on the forward end of said tubular bar in the plane of rotation of said wheel and in communication with said air passage, said hood having a lateral opening facing toward said wheel and positioned to receive dust discharged from the wheel periphery, and means for inducing a flow of air through said passage and away from said hood.

4. A grinder as defined in claim 3 in which said mounting means provides for adjustment of said hood along and around the supporting bar to locate said opening in the path of the discharged dust.

5. A grinder as defined in claim 3 in which said mounting means includes a part on said hood telescoping with the end of said tubular bar.

6. In a grinder, the combination of, a support, a head, a power rotated abrasive wheel mounted thereon, mating guideways supporting said head on said support for reciprocation along the axis of said wheel including a tube secured to the head and having an external surface defining one of said guideways and an internal surface defining an air conduit, a dust collector communicating with said conduit and mounted on said tube in a position to receive abrasive dust discharged from the periphery of said wheel, and means operable in all positions of said head to induce a flow of air into said hood and rearwardly through said conduit.

7. In a grinder, the combination of, a head, a grinding wheel rotatably mounted thereon, a tubular guide disposed adjacent said head, a tube longer than said guide secured to said head and having an external surface mating with and slidable in said guide, said tube having an air passage therethrough, a hood mounted on said head in communication with one end of said air passage and having an opening for catching dust discharged from the periphery of said wheel, and means for inducing the flow of air into said opening and along said passage to carry away the dust delivered into said opening.

8. A grinder as defined in claim 7 including a plate disposed within said hood behind said opening and perforated by holes through which air flows at increased velocity to carry said dust particles on into said air passage.

9. A grinder as defined in claim 8 in which said holes occupy a minor portion of the area of said plate and are distributed across the length and width of the latter.

10. A grinder as defined in claim 8 in which said hood hangs downwardly and said perforated plate is inclined inwardly from the upper edge of said opening and then reversely toward the lower end of the opening.

11. A grinder as defined in claim 10 in which the lower edge of said plate is spaced inwardly from the lower edge of said opening to form therewith an auxiliary opening leading to said air passage.

12. A grinder as defined in claim 11 in which the lower end portion of said hood forms a pocket for receiving abrasive particles which are not carried away through said holes or said opening.

13. In a grinder, the combination of, a support having laterally spaced parallel guideways thereon, bars slidable in said guideways and projecting therefrom, a head secured to the projecting end portions of said bars, said bars being tubular and defining air passages, a rotary abrasive wheel mounted on said head between said bars, a collecting hood communicating with the air passage in one of said bars and mounted on the end thereof in a position to receive dust thrown from the periphery of said wheel, means normally closing the air passage through the other bar but adjustable to open such passage, means in said support defining a chamber enclosing the other ends of said tubular bars, and means for maintaining said chamber under a vacuum to induce the flow of air through the open passage through said bars.

14. A grinder as defined in claim 13 in which said hood includes an opening facing laterally and means for coupling the head alternatively to either one of said bars with said opening positioned to receive abrasive dust discharged from the wheel periphery, and said closing means is mountable selectively on either one of said bars.

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